
LDs 40, 42: Call Detail Recording Diagnostic

The Call Detail Recording (CDR) feature outputs call records to a single or multi-port tape drive storage system. The tapes are processed to produce billing reports.

The Option 51C/61C/81/81C Pseudo TTY (PTY) and Call Processor (CP) cards do not support the CDR link maintenance commands (CDL, CTY) used in this Overlay. When using the STAT command in this LD, the output includes all the ports: CP and PTY.

Automatic diagnostic routines

LD 40 is run in background, during the daily routines, or automatically in response to CDR faults. It performs the following:

- CDR Link test.
- CDR Controller status report.
- CDR data transmission/loss summary.

Fault indications reported by LD 40 are cleared after their corresponding CDM message is output. Faults in a multi-port CDR Tape Controller are reported to all Meridian 1/Meridian SL-1 systems connected to the controller. The fault records kept for each Meridian 1/Meridian SL-1 are maintained and cleared independently of each other by the controller.

Loading LD 40 manually runs the automatic fault-clearing routines. Also, similarly to LD 42, the “CDMA loaded today” flag which prevents LD 40 from being automatically loaded more than once a day are cleared. Thus, manually loading LD 40 or 42 allows faults detected in the afternoon to be reported, even though previous faults may have been detected and cleared in the morning.

To run CDMA in background, you must reload LD 40 after a trouble has been cleared using LD 42. CDM117 X 3 is printed after LD 40 has been reloaded, where X is the Meridian 1/Meridian SL-1 link or port number. This reload is required so that the Meridian 1/Meridian SL-1 can react again as soon as another error is detected.

CDR maintenance mode and commands

Use LD 42 to:

- enable/disable/give status of CDR links and TTY
- perform diagnostic tests on CDR machines
- perform manual tape functions on CDR machines
- clear alarms and the maintenance display
- clear the maintenance display of CDR machines
- clear “CDMA loaded today” flags

The CDR storage system is put into maintenance mode to test the tape drive. While in maintenance mode, call records are saved in tape buffers. When all the buffer space is used up, incoming call records are lost. An 8K CDR machine can buffer about 600 call records; a 32K CDR can retain about 2500. Use the BUFF command to write the buffer contents to tape or output it to the I/O device.

Enter maintenance mode

- 1 Load CDM (LD 42).
- 2 Issue the PORT command to specify the CDR port.
- 3 Issue the GET command to put the CDR into maintenance mode.

GET sends the “Request Maintmode” message to CDR and waits for CDR to grant MAINTMODE, which CDR will not do until it is finished its current activity on the drive.

When CDR grants Maintenance Mode, it also makes available a tape buffer for the use of the read/write and RBC functions. This buffer may be loaded with data by using the LOAD command and the contents can be output onto the TTY by using the BUFF command without indicating which buffer to output (it defaults to the active maintenance buffer).

Exit maintenance mode

To ensure that CDR does not stay in maintenance mode forever, CDR starts a 30 second timer whenever it receives a request for maintenance mode. If this timer expires, CDR resets maintenance mode. To prevent this, CDM sends a message every 5 seconds to keep the CDR in maintenance mode.

If CDM does not send the message in time, CDR will reset maintenance mode and a CDM017 message will appear to indicate that maintenance mode has been lost. Pressing the UNLOAD button on CDR will also cancel maintenance mode.

The CDR may also be released from maintenance mode using the FREE command. When CDR leaves maintenance mode it returns to the state it was in before it entered maintenance mode. That is, if it was in a state in which it would not attempt to write on the drive, it will still not try to use the drive.

However, if it was using the drive before it entered the maintenance mode, it will use one of two methods to return to using the drive:

- If it left maintenance mode because of a time-out, it will rewind to LP and search for the first tape mark to locate the place where it should begin writing.
- If the FREE command was used to release it from maintenance mode, it will begin writing on the tape wherever the tape is. Thus, the tape should be left at the same point it was before maintenance mode was entered.

Ensure tape integrity

The following procedure is recommended to ensure tape integrity if manual tasks are to be performed on the drive using CDM:

- 1 UNLOAD the call recording tape from the drive.
- 2 Mount a scratch tape and put the drive on line but do not use any of the CDR pushbuttons. Call records are now being stored in tape buffers so this should only be done at low traffic periods.
- 3 Use CDM to issue the PORT and GET commands.
- 4 Perform tests using manual functions.
- 5 Issue the FREE command.
- 6 UNLOAD the scratch tape.
- 7 Remount the call-recording tape and press RESTORE to get the tape to the proper position for writing. If the tape is nearly full, a new call recording tape might be loaded instead to save time.

Verify proper recording

To verify that call records are being properly recorded on tape, the following procedure may be used:

- 1 Issue the PORT and GET commands to go into maintenance mode.
- 2 Issue the FUNC BKSP 1 command to position the tape just before the most recently written block.
- 3 Issue the FUNC READ command to read the most recently written block.
- 4 Issue the BUFF command to output the contents of the maintenance buffer on your I/O device.
- 5 Issue FREE to release the drive from maintenance mode.

This procedure may be modified easily to allow the checking of tape blocks older than the most recent. Extreme caution is advised, however, as it is easy to lose track of where the tape is positioned.

If it is suspected that the tape may not be positioned just after the last data block on tape when the FREE command is about to be issued, simply abort the program (****). This will cause the CDR machine to time out from maintenance mode after 30s, after which CDR will automatically restore tape position so that data recording can continue normally.

Basic commands

On Option 11 systems, Overlay 42 commands are available as described below, with the exception that on Option 11, ESDI ports are used instead of SDI ports.

BLOC	Output hexadecimal contents of CDR tape block
BUFF	Output contents of CDR maintenance mode buffer
BUFF x	Output contents of tape buffer x
CCDS x	Clear maintenance display of CDR on link x
CDSP	Clear the maintenance display on active CPU to 00 or blank
CMIN AL	Clear minor alarm indication on all attendant consoles
CMIN c	Clear minor alarm indication on attendant consoles for customer c
DIS LINK x	Disable device on link x
DIS SL1 x	Disable CDR device x
DIS TTY x	Disable device x
DISP pg addr cnt	Display CDR storage
ECHO x y	Perform echo test on link x, y times
END	Terminate command in progress
ENL LINK x	Enable link x
ENL SL1 x	Enable SL-1 machine connected to CDR link x
ENL TTY x	Enable TTY x
FREE	Release CDR from maintenance mode
FUNC function	Initiate specified tape drive function
GET	Put CDR tape unit into maintenance mode
LOAD xxxx	Set buffer for a WRITE
PORT	Reset port
PORT x	Set up links for commands to follow
STAT x	Get status of SDI x
STAT SL1 ALL, x	Get status of one or all CDR ports
STOR pg addr	Alter CDR storage information
TEST x	Write x sets of test records to tape

Alphabetical list of commands

Command	Description	Pack/Rel
BLOC	Output hexadecimal contents of CDR tape block.	clnk-1
BUFF	Output contents of CDR maintenance mode buffer.	clnk-1
BUFF x	Output contents of tape buffer x. For a single port CDR machine, $0 < x < 6$. For a 32K machine, $0 < x < 29$. The contents of the buffer may change while it is being output.	clnk-1
CCDS x	Clear maintenance display of CDR on link x.	clnk-1
CDSP	Clear the maintenance display on active CPU to 00 or blank.	clnk-1
CMIN ALL	Clear minor alarm indication on all attendant consoles.	clnk-1
CMIN c	Clear minor alarm indication on attendant consoles for customer c.	clnk-1
DIS LINK x	Disable device on link x.	clnk-1
DIS SL1 x	Disable CDR device x. This command should be issued before disconnecting another SL-1 machine from a multi-port CDR machine. DIS SL-1 x is the inverse of ENL SL-1 x. The commands may NOT be used to disable the SDI port currently being used by the CDM program; i.e., "you can't disable yourself." The enabled/disabled status of a SL-1 port in a multi-port CDR machine is maintained by the CDR machine only. If the CDR machine initializes for any reason - such as a power failure - then the enabled/disabled status of each SL-1 port is set according to whether the physical SDI device responds. For this reason, the enabled/disabled status of a SL-1 port in a multi-port CDR machine should not be considered trustworthy over extended periods of time.	clnk-1

LDs 40, 42

Note also that disabling a SDI port in the CDR using the DIS SL-1 x command causes the report "SL1 x DSBL <type> SOFT" to be given by STAT SL1 x. This status indication remains even after the SDI pack has been physically pulled out, until the next CDR initialization.

DIS TTY x	Disable device x. You may not disable the TTY you are logged into.	clnk-1
DISP pg addr cnt	Display CDR storage. Where: pg = memory page 0, 2 or 3. cnt = the number of words to output. If cnt is not entered, one word will be output. No checking is performed on the validity of the address. If an invalid address is provided, the CDR machine will trap with a response time-out. This command can be used to continue printing buffer contents, if time-out or transmission error occurs using the BUFF x command, rather than reissuing BUFF x and starting from the beginning again. In this case, the command is: DISP O addr 100 addr = given by the last 4-digit hexadecimal code preceding the colon in the last printed line.	clnk-1
ECHO x y	Perform echo test on link x, y times. A test pattern is sent to the CDR machine and the machine echoes it back. OK is output if a successful response indicates a fault-free link. If y is not provided, the test is performed once only.	clnk-1
END	Terminate command in progress. This command may be output at any time.	clnk-1
ENL LINK x	Enable link x. The specified link is checked for response and stuck interrupt. OK is output and the link enabled if the tests are passed.	clnk-1
ENL SL1 x	Enable SL-1 machine connected to CDR link x. This command is only valid for multi-port CDR machines. It enables new SL-1 machines connected to the CDR machine to communicate with the CDR, without interruption of service to existing SL-1 machines.	clnk-1

ENL TTY x	Enable TTY x. The specified TTY is checked for response and stuck interrupt. OK is output and the TTY is enabled once the tests are passed.	clnk-1
FREE	Release CDR from maintenance mode. If the CDR tape drive is enabled, then the next tape block that CDR has to write will be written wherever the tape was left. Thus, if the FUNC command was used on a tape which is to contain valid CDR data, it is imperative that the user reposition the tape to the same position that CDR had it before the FUNC command was used.	clnk-1
FUNC function	Initiate specified tape drive function. Initiates the specified function on the tape drive. “Function” may be one of: 1. STAT = status function 2. WID = write ID burst function 3. WTM = write tape mark 4. WFB = write contents of the maintenance tape buffer 5. READ = read block into maintenance buffer 6. RBC = perform read back check into maintenance buffer 7. SKIP x = skip x blocks in hexadecimal number 8. ERG = erase gap 9. ERAS = erase to end of tape 10. BKSP x = backspace x blocks in hexadecimal number 11. REW = rewind 12. UNL = unload 13. TERM = terminate These commands correspond to the primitive tape functions supported by the CDR tape handler firmware. The FUNC STAT command causes the tape status to be printed at the TTY. The tape status is the first word printed in response to the BLOC command and is the “status” field of a CDM122 error message. If the “unexpected interrupt” bit in the tape status is ON, a word corresponding to the “unexpected” field in a CDM122 message is printed.	clnk-1

LDs 40, 42

GET	Put CDR tape unit into maintenance mode. When CDR is in this mode, it will not initiate any tape functions of its own. A tape buffer will be allocated for CDM to use for tape functions. Only one SL-1 system may put the CDR into maintenance mode at one time. See the description of maintenance mode.	clnk-1
LOAD xxxx	Set buffer for a WRITE. The hexadecimal digits xxxx are propagated through the tape buffer allocated for maintenance mode. The command is used to set the buffer for a WRITE.	clnk-1
PORT	Reset port. Resets the port so that no port is active. Enter the following commands only after a PORT command, and only from a TTY: DISP STOR BLOC TEST x BUFF (continued on next page) BUFF x GET LOAD xxxx FUNC FREE ENL SL-1 x DIS SL-1 x STAT SL-1 x	clnk-1

PORT x	Sets the links to which the following commands will apply. This command may only be entered from a TTY. Take care when using the following commands with PORT or PORT x, as the CDR may trap data or write erroneous data to tape. DISP STOR BLOC TEST x BUFF BUFF x GET LOAD xxx FUNC FREE ENL SL-1 x DIS SL-1 x STAT SL-1 x	clnk-1
STAT	Lists all SDI packs and specifies whether they are dedicated to data links or TTY; enabled or disabled. Output is: <pre>SDI x <tty/link> <enbl/dsbl><messages> <naks> <time-outs> <lost></pre> If the device is an enabled link, then the number of messages sent, the number of transmission errors and the number of lost call records are also output. See error code CDM121 for a description of the <> fields.	clnk-1
STAT SL1 ALL, x	Get status of one or all CDR ports. This command is used to output the status of ports in multiport CDR machines. The format of the output is: <code>status type mode</code> Where: <code>status</code> = UNEQ (unequipped), DSBL (Disabled) or ENBL (enabled) <code>type</code> = SNGL (single-port SDI) or DUAL (dual-port SDI) <code>mode</code> = May be IDLE (normal idle), BUSY (normal busy), SOF (software-disabled), NOIS (disabled for too many interrupts), STUC (disabled for stuck interrupt condition) or EIA (disabled for having EIA device not ready)	clnk-1

LDs 40, 42

STAT x	Get status of SDI x. Output is: <tty/link> <enbl/dsbl/uneq> <messages> <naks> <time-outs> <lost> See error code CDM121 for a description of the <> fields.	clnk-1
STOR pg addr	Alter CDR storage information. The old contents of the location is output and the user is prompted for the new contents. After entering the new contents, enter a space or carriage return. If a carriage return is entered, the command ends. If a space is entered, the contents of the next location are output and the user is prompted for input. If only the carriage return or space is entered (i.e., the new contents are not input), then the current word is not modified. If an invalid address is provided, CDR will response time-out.	clnk-1
TEST x	Write x sets of test records to tape. Before using this command, refer to the description of the maintenance mode prior to this table. If x is not given, the default is 1. As this command writes to tape, a scratch tape should be mounted before the command is executed. PORT and GET commands must be issued before this command can be used. Twenty blocks of data are written to the tape, then the tape is rewound and read to check the data. The number of errors found is output using a CDM035 message.	clnk-1
